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The present is suspended between a great memory and a great hope—memory of what men did in the past, and hope of what they will do in the future.—Author not known.

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"No man, no matter how critical, can stand up before a class and refrain from saying more than he knows."

—M. R. COHEN,

Formerly Professor of Philosophy at City College of New York.

EDITORIAL

Oral Cancer

The challenge of oral cancer is being met today by a better informed and more alert dental profession. Patients in an ever increasing number are consulting the dentist first concerning problems of precancerous lesions in the mouth. The responsibility, therefore, of the dentist, in cooperation with the lay educational program, is to observe the oral tissues carefully for any evidence of malignancy and to assist as much as possible in arriving at a timely diagnosis. Every dentist must become thoroughly familiar with the tissue biopsy as an instrument of diagnosis to be applied to any suspicious lesion and should also acquaint himself with the character of malignant lesions and evidences of invasion and metastasis such as the condition of the proximal lymph nodes.

The concept that cancer is incurable is no longer tenable but successful treatment depends upon early recognition. Oral cancer is far more serious than any lesion with which it can be confused and we must develop the habit of thinking of cancer first in the examination of any lesion. The dentist in dealing with a cross section of the population, who are in the main clinically healthy, has the opportunity to emphasize the importance of medical advice for some of the early symptoms of cancer. An attitude of reassurance and conservative treatment might encourage a tolerance on the part of the patient with subsequent disastrous results. The differential diagnosis of benign and malignant oral lesions is within the prerogative of the dentist and constitutes in the finding of positive cancer an emergency whereby a small growth can be completely removed by means of a moderate incision or limited application of radiation therapy preventing its subsequent invasion and metastasis.

The Federal Security Agency of the Public Health Service through the National Cancer Institute has established cancer training courses in thirty-seven of the dental schools of the country enabling the teaching of undergraduates the early recognition and treatment of oral cancer. All of the dental schools in California are participating in this program. These groups in aid are also extended to post graduate courses for the practicing dentist who will avail himself of the opportunity when presented to become more conversant with the cancer problem.

There are 78,000 practicing dentists in this country who see approximately one-fourth of the population every year (35 million people). Remembering the formula "prevention, early discovery and adequate treatment" they will be amazed at the number of cancer cases they can detect and the number of lives they can alter and save.

Oral Diagnosis

A new approach to the problem of correlating oral and systemic disturbances will shortly be under way, sponsored by the Oral Diagnosis Section of the American Association of Dental Schools. Gordon Agnew, of the University of California, has been authorized to organize a project of an interschool nature in the development of which each school would be invited to undertake (or to continue if already initiated) clinical or laboratory studies looking to a better understanding of oral-systemic interrelationships, and to the establishment of practical methods of approach to diagnosis in this vital area. It is proposed that the participating institutions choose their own projects according to available personnel, facilities, etc., and that these studies be continued over several years in order to accumulate data of such dimensions as to afford real significance.

Dentistry, for too long, has waited for other divisions of the healing sciences to give definitive guidance in the evaluation of the mouth in terms of bodily health; and this project may be of service in focusing the attention of the dentist on the necessary harmony between the engineering and biological elements of his calling and in strengthening his hands in the achievement of this end.

On Working Together

The year 1950 is upon us—the first fifty years have passed and we go on into the second half. Proverbially speaking, the most difficult years have gone, therefore we will find it easier as we now go forward. We will, if . . . This is one of the smallest words in the dictionary and at the same time, one of the biggest, because so much depends upon it. However, so far as we are concerned just now, reference is being made to the development of our annual programs and their subsequent publication.

Will you, Section Chairmen and Participants, prepare your written work for the editor, and might not all of us think in terms of its publication all together, in the Journal Forum? In that way our readers can have it as presented and it may be of greater value. It would be well, if two copies could be prepared and one sent on to the editor even before its presentation. None, however, will be published before the Annual Meeting. Q.E.D.

ORGANIZATION AND EVALUATION OF A TECHNICAL WRITING COURSE

GEORGE BATTERSON, M.A.,[1] *Portland*

The course in technical writing at the University of Oregon Dental School is composed of eleven hours of freshman lecture and demonstration accompanied by one-half hour of individual conference between instructor and student. This is followed by twenty-two hours of writing and oral reporting workshop. The latter activity is spaced eleven hours each at a strategic time during sophomore and junior years.

Realizing that writing and expression problems of freshman students are closely related to reading and study, examination writing and oral expression, these are made the object of special consideration as well as strict technical writing methods.

Objectives and Method

The objective and method of the eleven-hour lecture-demonstration course given in the second term of the freshman year are outlined briefly as follows:

First hour objectives: Stress is laid on the multiple purpose of the course and examples of typical writing errors made by dental students are studied. *Method:* Examples of student written term papers, examination papers and case reports, illustrating high and low standards of written technical expression, are submitted. Presentation is made by lantern slides in addition to samples of written papers. A point of view of dental professional organizations, e.g., the State Board of Dental Examiners, American Dental Association and the Local Dental Society, is cited. Faculty members who have done scientific writing stress the importance of ability in technical expression, no small part of which plays an important role in the development of professional attitudes. Scholarship difficulties of freshman dental students and the value of study methods in their solution are discussed. Case examples are presented.

Assignment for Course. Assignment consists of two major activities. (1) The study and analysis by the student of scientific articles based on freshman curriculum requirements, the following types being read and analyzed: report of scientific study or experiment; description of a new technic or method; description of a new instrument; case history; description of a disease in man; monographs; résumé of literature (dental); popular article (dental); article with social or economic implica-

[1]Educational Advisor, School of Dentistry, University of Oregon.

tion for the dental profession; article on dental history; and finally, a term paper written by a dental student. Students are required to comment briefly on the above items criticising their adequacy in the following respects: title; outline and organization; unity; coherence; tone; clarity of expression (verbosity); illustrations; summary and/or conclusions. (2) A second activity is that of writing a paper relating to requirements in the basic science division or freshman laboratory courses.

Second hour objectives: (1) Use of the dental school library; (2) plagiarism and bibliographic note-taking; (3) introduction to the general characteristics of dental scientific articles as described in the first class hour. *Method:* 1. The dental school librarian discusses the use of the library, stressing the various indexes, year books, and abstract journals. Analysis is made of types of dental periodicals (trade vs. professional journalism) and the importance and use of periodicals related to dentistry and medicine (Journal of the American Medical Association and the Journals of Anatomy, Physiology, Biochemistry, etc.). 2. A slide or blackboard illustration with discussion of the importance of accurate and complete bibliographical note taking is presented. 3. Characteristics of typical dental scientific articles are analyzed and the distinguishing features noted.

Third hour objective: A critical student group analysis is made of a scientific article stressing the general characteristics of good technical writing, the criteria for which were presented during the second class hour. *Method:* A faculty member who has had wide experience in scientific writing makes a critical analysis of one of his own contributions to literature, stressing the following: motivation for writing; personal and professional value; desirable characteristics of the article, errors that would be corrected and improvements that would be made, were the article to be rewritten; application of scientific thinking and method; how application of basic steps and principles of technical writing were applied to the paper. (Each student is given a copy of the article for reading.)

One-half of the class hour is devoted to analysis by the faculty member and the other half to student questions, suggestions and further analysis guided by the class instructor.

Fourth hour objectives: (1) Selecting and delimiting the subject and study of typical outlines applicable to dental writing; (2) study of title selection and construction, and writing a discussion, conclusion and/or summary section. *Method:* 1. Slide or blackboard examples are shown of typical outlines, showing how to build and organize an outline for

a technical article. 2. A lecture follows with examples of good and poor form, as follows: selection of title and construction; the introduction; characteristics of a good discussion of data; and construction of a summary, or conclusion section.

A class exercise during the last fifteen minutes of the period requires the writing of a brief statement summarizing the lecture and demonstration.

Fifth, Sixth and Seventh hour objectives: Acquaintance with basic characteristics of satisfactory and unsatisfactory writing. *Method:* Prepared illustrations (mimeographed data) from student technical writing or from literature are presented together with definition and discussion of the following items: logical thinking (good, bad or indifferent); organization (good or bad); verbosity; dental-medical jargon and slang; awkward or incoherent expression; misuse of technical terms; unity; tone; development; and common errors.

Fifteen or twenty minutes of each period are devoted to class exercises wherein students write briefly, correcting and revising examples from the above. These exercises are followed by discussion.

Eighth hour objective: An understanding of the mechanics of technical writing. *Method:* Slides and mimeographed material, and blackboard examples are submitted as follows: citation of literature; form of title page, index, bibliography, spacing, indentation, numbering, charts, tables, etc.; footnotes to text and tables (documentation); use of title headings, subheadings, and paragraph side-headings; spelling, capitals, italics, etc.

Lecture, demonstration, and case examples from student and faculty writing.

Ninth hour objective: An understanding of the construction and use of illustrative material. *Method:* The instructor in the Department of Illustration demonstrates the use of photography and other technics in dental literature. (Still slides showing satisfactory and unsatisfactory illustrations are used.) Construction of charts, graphs and diagrams is illustrated by slide and blackboard example. Students are encouraged to prepare illustrative material from clinic experience when writing case reports, investigative papers, etc., and to work with the department of illustration in their preparation.

Tenth hour objective: To encourage application to written examinations, principles and technics of effective examination writing, the basic principles of which are presented through lecture and illustrations during the first term of the freshman year in the course in Dental Orientation. *Method:* Faculty members giving courses with whom students have experienced particular difficulty when writing examinations present typical examination questions and examples of errors made by students in an-

swering them. Typical errors emphasized are: (a) failure to identify and interpret accurately key words in questions, e.g., explain, outline, define; (b) garbled expression (bluffing); (c) loose use of technical terms; (d) factual but wordy and time-consuming answers; (e) factual but disorganized answers; (f) lack of unity (writing off the subject); (g) incoherent expression.

Mimeographed copies of objective and subjective questions prepared by members of the faculty are presented and during the discussion students are free to analyze and comment critically on their clarity, validity, and general construction, including a discussion of grading curves. Objectives of different types of examination questions and methods by which validity and reliability in the test are attained, are discussed.

Eleventh hour objectives: (1) Review of study methods about which a one-hour lecture and demonstration is given during the first term (Freshman Orientation); (2) provision of one-half hour workshop time to review and clarify term paper questions and problems. *Method:* Four basic areas of study and learning technique are briefly reviewed and discussed: effective reading; effective learning (part vs. whole); effective use of time (study schedule); effective note and examination writing.

During the remaining half hour, students who have set a high standard of form and expression in term paper preparation report orally the salient features of their papers using the blackboard to indicate their methods.

The Journal Club (Workshop)

Following the eleven hour lecture-demonstration and conference course, opportunity is provided for student analysis and reporting on current dental periodical literature. This activity is conducted by an organized Journal Club, following the workshop idea. Students select articles based on interest, importance and relationship to courses previously or currently studied. Faculty members are present at each meeting to criticise and evaluate the reports.

Evaluating Results

An analysis of results may be made by reviewing certain subjective and objective evidence, under the following headings: results from formal examinations; results from term-paper exercises written to satisfy technical composition course requirements; results from investigative theme requirements of regular science or technic classes; results from conference on oral reporting (see case histories, etc.); subjective evaluation and comparisons made by individual faculty members with wide writing

experience; evidence of increased use of the dental library; evidence of increased faculty interest in a higher standard of student expression; evidence that better study and reading techniques and habits are reflected in higher student scholarship and fewer individual study problems; evidence of interest in the course by students.

Other and specific factors used in measuring the success of student formal course work were: results in subjective and objective examinations; grades on the term paper written as a composition course requirement; grades on analysis of dental literature made by students; evaluation of oral reports of dental literature.

The results from the foregoing were judged by the instructor to be generally satisfactory. Term end grade allocations in a class of 68 were: 9—A, 32—B, 23—C, and 4 incomplete.

The relatively favorable number of A and B grades seemed reasonably valid since they were determined on a rather wide cross section of student activity and accomplishment. The question is raised, however, as to whether students having a background of writing knowledge and understanding will make any application in their regular dental work. This may be answered in part by reporting on the quality of representative term-paper work done by students in science courses.

Evaluation of Term Papers Written in Science Courses

General pathology and physiology term papers written by present senior students who had not taken a course in technical composition were compared with similar papers in the same courses written by present junior students who had completed the course.[2]

Random samples of ten papers each selected from general pathology and physiology for the two classes mentioned above were individually evaluated by three faculty members representing the dental school library, department of general pathology and instructor in technical composition. The final evaluations of these three were in turn reviewed by the heads of the anatomy and physiology departments. Each paper was read and judged on the following factors:

a. Outline and organization;
b. Clarity (coherence, expression, unity, use of words, etc.);
c. Thinking (discussion, summary, conclusion);
d. Content (development, pertinent data, use of literature).

The rating scale was the usual A, B, C, D and failure symbols, and

[2]It is interesting to note that based on results of the English and word dexterity sections of the aptitude tests of the Council on Dental Education (ADA), the two classes here compared showed virtually the same basic English expression ability prior to entering dental school.

the quality standard was established on application, or failure to apply rules and principles of technical writing. No thought was given to the relative achievement of the best paper in any one class. All three faculty judges rated each paper independently. The results are shown in Table I. The grade at each level indicated is an average of the three raters' independent grade for a given paper.

While this evaluation is not based on large numbers, the wide difference in quality between comparative papers written with and without writing instruction lends considerable support to the effectiveness of a technical writing course. This evidence was further strengthened by a survey of opinion among four members of the faculty with experience in dental, scientific, writing. Each member selected had made either investigative

TABLE I

SHOWING RESULTS OF FACULTY EVALUATION OF TERM PAPERS WRITTEN BY STUDENTS WITH AND WITHOUT TECHNICAL WRITING INSTRUCTIONS

PHYSIOLOGY TERM PAPERS			PATHOLOGY TERM PAPERS		
Grade	Term papers written by students with technical writing instruction	Term papers written by students without technical writing instruction	Grade	Term papers written by students with technical writing instruction	Term papers written by students without technical writing instruction
A	2	...	A	...	...
A−	1	...	A−	1	...
B+	2	...	B+	...	...
B	1	...	B	1	...
B−	2	...	B−	2	...
C−	1	...	C+	4	...
C	1	1	C	2	2
C−	...	2	C−	...	1
D+	...	1	D+	...	4
D	...	1	D	...	1
D−	...	2	D−	...	1
F	...	3	F	...	1

themes, laboratory or experimental report, or case report writing a requirement for his classes, with and without the benefit of the technical composition course. All four faculty members agreed that the quality of the written work was distinctly superior for the classes having completed technical writing instruction. Among the latter class of students were many whose written work was judged suitable for publication.

Examination Writing

Evidence that students apply principles of effective technical and general expression and form in examination writing is also important in the over-all evaluation of the subject course. This evidence was not so easily or conclusively attained. General faculty opinion indicated that as the result of examination writing and technical composition instruction, students had improved in clarity of expression and in reduction of errors of expression. An attempt to obtain specific evidence of this improvement was made by carefully analyzing errors made between freshman and sophomore classes in anatomy and physiology and seniors in dental economics and history. The former classes had completed the technical composition course. The seniors had not.

An analysis of expression errors among 73 sophomore final examinations papers in physiology (Growth and Development), showed 6 cases of error and ineffectiveness of expression. In a freshman anatomy class of 67 students there were only four errors. However, the senior final examinations (Dental Economics and History) disclosed 33 errors made in a class of 38 students. This analysis was made by the instructors of the respective courses and reviewed by the instructor in technical composition. The evidence from this analysis is not sufficiently conclusive to draw conclusions of great validity. Under the stress of examination writing students are liable to be less careful of technical expression principles. However, it is believed that it can be said with fairness that the University of Oregon Dental School students who have studied technical writing and the technic of examination writing are demonstrating somewhat greater ability for logic and clarity in oral and written examinations.

Use of the Library

The course in technical writing stresses among other things a wide acquaintance with, and reading and use of dental, and scientific periodical literature in all courses. The faculty is encouraged to cooperate in interesting the student in reading current literature bearing on didactic, technical or clinical study. Within the Journal Club attention is directed

to the clinic, laboratory and all phases of prosthetic techniques, exodontia and oral surgery, pathology, anatomy, and physiology, these departments having assigned current literature reading. Assignments are made on the basis of student interest and this interest plus the knowledge of standards applying to the building of bibliographies in written work has been an important factor in an increased use of the dental library since 1945.

Library records reveal over three times the number of books and periodicals used by students from October, 1946, to June, 1947, as compared with the period October, 1945, to June, 1946. This increase is not entirely attributable to the composition course. Other factors such as increased time provided for library use, increased library facilities, and a growing consciousness among members of the faculty of the importance of collateral reading supplementary to text assignments, has helped to bring about the change. The library record of student use month by month shows a definite increase beginning with the months April, May, and June, 1947, when the course was instituted and a consistent though smaller increase from that time to date.

The library records are based on overnight library loans and do not include records of books and periodicals used within the library. Studies within the library have had a corresponding usage increase to that reported for material taken out.

Faculty Interest

Faculty interest has played no small part in establishing this high standard in clarity of expression and form, in all student writing, including examinations. Instructors make special note of errors in written examinations and are planning student-instructor conferences in order to help those students having particular difficulties in writing clearly and logically. Encouragement is given to the preparation for publication of interesting case histories or experimental projects developed by students.

Instructors in anatomy, pathology, clinical conference, etc., make heavy requirements on the student to investigate and report upon current dental literature. A cross section of opinion from instructors attests the growing abilities of students to discuss applicable data and results. The teaching staff as a whole is giving more attention and interest to the development of panel and seminar type of instruction.

Evidence of Student Progress

It is difficult and perhaps unfair to attribute outstanding scholarship of particular students or classes to any one factor. Least of all can it

be said that four hours of lecture-demonstration and discussion of study technics (study schedules, reading, examination writing, etc.) is sufficient to produce a marked improvement in over-all student attainment. Probably equipped with understanding of principles and their own inherent abilities for technical expression, reading and study, freshman and sophomore students are aided materially in meeting higher standards.

Specific ways in which student technical composition have been advanced may be cited: (1) The head of the department of general pathology reported a higher grade of work for the 1947-8 sophomores in a course requiring extensive reading both in text and current literature, a thesis based on original investigation and oral conference; (2) the head of the prosthetic department reported similarly but with particular reference to the students' increased ability for organization and clarity in written and oral examinations; (3) instructors using the seminar method have reported very favorably on the growing ability of students to think things through and to express themselves with greater facility.

Conclusion

The results reported point to definite and important values for student and faculty of a course in technical writing and oral expression. These may be indicated:

1. Improvement in term paper, investigative theme and written case report.
2. Better oral expression and increased ability in conference, seminar and panel type of instruction.
3. An ability to meet higher requirements.
4. Encouragement of students to write for publication.
5. A trend toward greater care in organized thinking and clarity of expression in written examinations.
6. Opportunity to organize and conduct orderly and effective dental meetings.

The ability to convey ideas succinctly, clearly and orderly in writing and orally, is a mark of the professional man. The ability to study effectively in professional school as well as during a professional career is highly important to the best public service.

EDUCATIONAL TRENDS IN PARTIAL DENTURE PROSTHESIS[1]

OLIVER C. APPLEGATE, D.D.S., D.D.Sc.,[2] *Ann Arbor*

This paper aroused considerable discussion in the 1949 meeting of the partial denture section of the A.A.D.S. It was agreed by the large group present that a committee make further study of the problems raised by Dr. Applegate and that a report be made at the next meeting. This will be done in the form of a panel discussion, each member presenting the view of a School in which the dental technician aid to the student has differed.—D.A.L.

A study of current problems and an attempt to estimate probable future trends in any phase of dental education should take into consideration a new situation now confronting dental educators. For the first time since the present "two-four" curriculum was inaugurated, dental schools are feeling the full impact of this schedule in providing an adequate faculty as well as suitable clinical, laboratory and other physical facilities. This plan provides for two years of pre-dental and four years of dental education leading to the degree of "Doctor of Dental Surgery" or its equivalent.

A financial depression period followed closely the introduction of the "two-four" schedule in dental education and, as a result, for several years dental students were few in number. Barely had the depression receded, when there occurred another depletion of student ranks caused by the exigencies of World War II. Not since its introduction, until now, has this present dental curriculum been subjected to the stress of capacity enrollment. The classes of 1950 and 1951 are providing the first *maximum-load* trial of this plan. There will be some vexing problems of staff, budget, equipment and building facilities encountered under this new pressure. These next few years may prove to be a critical transition period during which this curriculum will meet its first real test under conditions which are likely to exist in dental education of the future.

Any necessary adjustment to this new situation may prove to be particularly trying in the case of partial denture prosthesis since this subject is only now attaining the full status of departmental rating. If this subject has remained, as at some schools, still appended to the department of complete denture or that of crown and bridge, then any adjustment to changing conditions may be more complicated. Under such combined administration, any readjustment which might be indi-

[1]Read before the Partial Denture Section of the American Association of Dental Schools, Chicago, Ill., June, 1949.

[2]Professor of Dentistry, Director of Partial Denture Prosthesis, School of Dentistry, University of Michigan.

cated by partial denture problems would be likely to be made more on a basis of joint consideration and less on the particular merits of the partial denture aspect of the picture. But, regardless of the method of administration, let us attempt to evaluate the effect of this new congestion in dental schools on the teaching of this subject.

Will the Present Demand for Dental Education Continue?

First, it is quite logical to wonder whether or not the present teaching load in dentistry is likely to continue for a considerable time. Is this surge of applicants for dentistry merely a temporary condition? There is to be found some difference of opinion on this point. It is the considered belief of some conservative educators and others conversant with the dental situation in America, that the present influx of applicants for dental training will continue at "flood stage" for some years to come. My personal feeling is that this pressure will not lessen until the demand for restorative dental service has been effectively reduced by some method of successful caries prevention applied on a communal scale. In fact, several sound reasons may be cited to substantiate the belief that the available dental service in the period immediately ahead may be less than adequate to meet the public demand. But, when and if such a control is available, it will need to be widely administered for at least a decade in order to achieve a material reduction of the partial denture service required.

One factor in a possible dental shortage that has much to do with this is the age distribution of the present supply of dentists in this country. The survey conducted in 1941 by the war-time Procurement and Assignment Service showed that 51½% of the dentists practicing at that time were then forty-five years of age or older. This group have sustained the impact of two world wars and a long, serious business depression. Such experiences cannot fail to leave their physical effects, particularly on a group engaged in a daily vocation as enervating as is dentistry. Because of these factors—age and environmental conditions—it is wishful thinking to expect the desired longevity of service from the older segment of our practicing dentists. The loss from active practice by death and incapacitation, in the higher age group particularly, may be very heavy during the next ten or fifteen years. Present vital statistics among dentists would tend to substantiate this probability.

Some persons are inclined to point to the present high enrollment in all dental schools as an assurance of adequate replacements to compensate for this anticipated depletion of dental man-power. But does the present congestion in dental schools necessarily mean that a record is also being made in the number of graduates in dentistry? On the con-

trary, the fact is that the maximum possible number of graduates of all the dental schools of this country does not equal the number which were graduated prior to 1924—twenty-five years ago. In the face of the present tremendous influx of applicants for dentistry, this would seem impossible. The reason for it, however, is quite easily found and readily understood.

Prior to the present two-four curriculum only one class needed a complete schedule of accommodations in the operative clinic. Now, both the Junior and Senior classes must be afforded this facility. Because of this fact, the actual effect of this curriculum change has been to greatly reduce the possible number of the graduates of any school unless its physical plant could be greatly enlarged. As an example, Michigan can now graduate a maximum of ninety. By comparison, there were in 1923 at this school, 126 graduates in dentistry. Other years in this period produced classes of 104, 115 and 119. Since all of the dental schools of this country have adopted a curriculum of at least the two-four minimum, a similar comparison might be made at any other school where no program of building enlargement has taken place.

This statement of fact is not advanced as an argument against, or criticism of the present standard of requirements in dental education, but on the contrary, the present graduate is much better trained and in many ways is a more finished product. Nevertheless, the fact remains that, in the face of an accelerating loss of practitioners in dentistry, the capacity of the dental schools to replace these with new graduates is less than it was twenty-five years ago! This is the none too optimistic picture of the future supply of dental service.

Will the Demand for Dental Service Increase?

Let us now look at the probable need and demand for restorative dental service of the next decade. It is my belief that this need will likely be increasing for some years yet to come. Certainly there is no evidence to support the belief that dental caries is any less prevalent or that its ravages are any less destructive now than formerly and it should be recognized that most dental prosthetic requirements actually originate with dental caries. The number of partially or completely edentulous among those inducted for military service in the recent war would certainly disprove any idea that this need is decreasing. But, need and demand are, admittedly, very widely separated at times. Is that true in this situation? Partial denture *demand* will never equal the actual need but it will be very great, nevertheless.

There are these very good reasons to be counted as indications that the demand for dental service will increase (unless there should occur a serious economic upheaval):

First, there is the population growth to be considered.

Second, there has been a steady rise in our living standard and this will result in an increased demand for all types of health care;

Third, there has been maintained continuously an educational campaign aimed toward better health in general and better care of the teeth specifically;

Fourth, to these reasons, there must be added the indirect but none the less potent effect of the recent military experience of millions of men. Hundreds of thousands of those in the armed forces made their first contact with dental service as a result of their war experience. Many of these discovered the advantage of dental care too late to save their own teeth. These fathers of the next generation came back to civilian life with the firm resolution that their own dental tragedy would never be experienced by others of their family if early dental attention could prevent it. There is no reason to believe that the need for partial denture service does not exist to a very considerable extent, though perhaps not to the same degree, among the wives of these veterans. Certainly, the consciousness of its need will have been stimulated by the military experience of the husbands of many. And so because of this war contact with dentistry, there was a great demand for dental service created much in advance of what would have been its normal rate of occurrence.

It has been suggested that while this may be true of dental service as a whole that it would not apply, necessarily, to partial denture prosthesis in particular. In considering this point, however, it should be noted that the *preventive* aspects of the early replacement of lost teeth has, in recent years, been receiving so much emphasis that the *demand* now more nearly equals the *need*. Of the various functions of a partial denture, the improvement of the ability to masticate may not always be the most important. Rather, the prevention of the tooth movement—tipping, extruding, rotating, separating, etc.—which follows the extraction of one or more teeth from the arch may be of equal or greater significance. It is this tooth disarrangement that causes, eventually, most of the failures of the structures in the dental arch which has become partially edentulous. Said DeVan of the prosthodontist's attitude to this, "He should be concerned with the preservation of that which remains rather than with the meticulous replacement of that which is missing." As dental students gain this concept of partial denture prosthesis, the value of and the demand for it will be increased.

However, they should be admonished from going to the other extreme and rendering this service where such replacements can serve no function, preventive or otherwise. The commercialization, using this term

in its most objectionable sense, of this prosthetic service has become evident to the observant public health official and in recent years he has become inclined to view this type of dental service with reservation, if not distrust. This group may exert considerable influence in combating the vicious tendency among a minority to prescribe this service where it has little or no chance of contributing a worthwhile function for a reasonable time.

It is a safe conclusion that there will exist in the years ahead both the need and demand for much restorative dental service. In fact, if any such program of health service is attempted in this country as is now being tried in England, the demand for dental prosthesis may assume impossible proportions. Facing this possible future demand, however, we find a declining dental man-power reserve if, indeed, a reserve may even now be said to exist. It seems only logical and conservative that these facts be duly considered in the formation of policies to govern basic education in dental prosthesis of the future.

Future Use of Auxiliary Services in Prosthesis

The very first consideration having a far-reaching effect on the planning of training in dental prosthesis is the degree to which auxiliary services are to be recommended. The delegation of the construction phases in prosthesis has steadily increased in recent years in dentistry. This tendency received a very sharp increase as a result of the greatly reduced supply of dental service to civilians during the recent war. It has been my experience in many years of graduate and postgraduate teaching, to observe a progressive decline in the interest which practicing dentists have manifested in the construction phases of partial denture work. With the possibility of a still lower per capita ratio of dentists to patients and with an increasing premium thus being placed on available chair-hours, this trend is due for further acceleration. The dentist who devotes any time to the processing of his partial dentures is likely soon to become a very rare specimen. The increase in the number of commercial dental laboratories and the amount of their annual business in this one type of prosthesis is confirmation of this view.

The conservation of the time and energy of the dentist is highly commendable. His greatest service to the public can be accomplished by rendering to the largest possible number of patients those skilled services for which he alone is trained. Neither his time nor his energy should be spent in doing things which can be done by those of competent but less specialized training. Since a dentist has but two hands and each day has but a few efficient hours, it must follow that the fullest possible use

should be made of competent assistants. Let it be emphasized at the outset that such delegation of duties, performed in the past to a considerable degree by the dentist himself, must be limited to the extent which permits the maintenance of high standards of health service. Obviously, those services for which only the dentist has been trained cannot be delegated. But, there is no question that many of the steps of a purely mechanical nature may be properly placed in the hands of a well trained helper. There is no more reason for the prosthodontist to do the actual processing of a partial denture, after its design has been indicated, than for the ophthalmologist to grind the lenses for which he has just prescribed. In fact, because of superior laboratory facilities, for which the dentist has neither room nor enough use, and by the more frequent repetition of certain construction procedures, the dental technician may execute a prosthetic appliance more efficiently and produce a result superior to that of the dentist.

It would seem, then, that the *principle* of delegating the construction steps in dental prosthesis is not the issue to be considered—it hardly seems debatable. Rather, it would appear that the questions for consideration are, in the case of partial denture prosthesis, the point at which assignment should begin and the extent to which it should continue. After giving the oral health of the patient its proper place of first consideration, at what step of construction may the dental technician then take charge? For how much of the construction phase should he be made responsible?

I believe that these questions should be seriously considered and that reasonable answers should be formulated without delay. We need to clarify the thinking and attain some degree of agreement before attempting to establish policies governing the future prosthetic training in dentistry. If these policies might be made so as to be in keeping with accepted practice in modern dentistry, then it would seem that much confusion for the student might be avoided and that he might have more confidence in our other recommendations. Dental teachers should not fall into the position of holding out for procedures which, because of changing practice conditions, have become outmoded. If a student finds that a teacher has taken an impractical and unwise position in one aspect of his subject, there is the risk that all of the rest of that teacher's work although perfectly logical, may be accepted at some discount.

The members of this group know that the delegation of the construction steps of partial denture work is now accepted procedure even in the best practices. Should not the student training be modified from that required when it was customary for the dentist to do all or most of

these in his own laboratory? Hence, the question is being asked these days as to whether or not the dental student should be required to spend a considerable number of hours becoming proficient in technical steps of which he will make but limited use in practice. I have advocated that the dentist of the future should not be spending his limited time or energy on certain construction phases but I hasten to state that I do not propose to eliminate student training in prosthetic technics.

In the first place, these technic courses constitute excellent manual practice for acquiring the finer digital dexterity so essential in the exacting operative procedures of intra-oral work. Secondly, in order to properly integrate the steps of mouth preparation, the dentist must know the exact nature and location of the component parts of the partial denture and this involves an understanding of the principles underlying the theory of design. In other words, he must know what the technician will produce in order to know how best to prepare the mouth to receive it, or, more properly, he should tell the technician what is needed to produce the best restorative result. Again, the dentist is the one who must integrate the physical and mechanical elements of prosthetic dentistry with the biologic. It is he who must evaluate and control the forces introduced by a prosthesis so as to keep the induced stresses within the limits of that particular patient's tissue tolerance. This makes for the successful result in this field—such a partial denture is not just an accidental combination of metal and acrylic to which some porcelain teeth have been attached. In it, there is a nicety of biologic coordination that supersedes the mere physical. Finally, the drastic curtailment of student training in prosthetics should not *precede*, even if it were wise to have it *follow*, the establishment of formal training of the dental technician on a wide scale. There is no indication that such a program is contemplated at this time.

It would seem then, that the student training in this field should be directed toward a grounding in fundamentals rather than perfection in technical steps, an end which could only be attained by means of unlimited repetition. In reducing the time which this would require, we will release hours that might better be spent aiming at competence in matters pertaining to problems of diagnosis, treatment planning, problems of survey and mouth preparation, impression registration and partial denture design, problems of stress control and how to maintain a partial denture in satisfactory service for a longer period. As teachers of dental prosthesis we may need to revise our whole philosophy regarding the preparation which the student needs in this field to best take his place in the future practice of dentistry as modern conditions dictate.

TEACHING METHODS IN THE RESTORATIVE FIELD OF OPERATIVE DENTISTRY

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The present report describes the methods currently in use in the teaching of Operative Dentistry at the Harvard School of Dental Medicine. In an earlier publication, Dunning '48 outlined the aims, objectives and status of the Harvard School of Dental Medicine. He emphasized that the program at Harvard was not intended as a pattern to be followed by all dental schools but was designed to test new approaches to the problems of dental education. Findings may be applicable in whole, or in part, to schools with larger enrollments.

The main problem in dental education was believed to be the development not only of clinicians but of clinical scientists in dentistry. Furthermore, it was accepted that clinical scientists are as badly needed in dental practice as they are in dental teaching and research. A scientist in any field is one who must be capable of meeting his problems by reasoning. To accomplish this objective the procedures of operative dentistry must be taught from basic principles and measured by a grasp of those principles rather than by the achievement of technical excellence through the repetition of technical exercises. It is equally imperative that these procedures not be divorced from the patient.

The personnel engaged in planning and carrying out the above program are thoroughly experienced in orthodox methods of dental teaching. It is admitted that orthodox methods may lead to an earlier attainment of technical excellence on the part of the student and that those procedures are easier to teach. In the face of these difficulties and what, to some observers, must appear to be serious disadvantages, the program to be described has been adopted because of the conviction that important advantages are offered which are lacking in whole, or in part, in many orthodox programs. The greatest advantages are: (1) the student who learns to reason from basic principles develops a background of knowledge which enables him to improve and progress throughout his professional career; (2) the background so obtained better prepares the graduate to meet the changing needs and demands of his profession; (3) the general problems of the patient are emphasized in the student's mind over the purely technical ones; (4) an unwillingness to accept dogma and a curiosity are fostered which are badly needed in dentistry today and (5) the intellectual content of dentistry is increased to the point

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where we can compete more favorably for men of the calibre we would like to see and need in our profession.

Obviously schools engaged in the important task of training men to meet immediate dental needs must of necessity deal with large classes which makes educational experimentation difficult. Large classes, automatically eliminate the possibility of a tutorial type of teaching, recognized as unsurpassed in providing for individual opportunity and advancement. With small classes and a close student-teacher relationship, however, the results of changes in teaching method or course content become readily apparent; mistakes can be easily rectified without the disastrous effects which would follow if the experiment were tried with a large class.

The time-consuming bulk of technical training, traditionally considered necessary to develop dental skill, constitutes one of the major problems in the teaching of dentistry today. Wherever this preliminary phase of operative dentistry to which the euphemism "basic dental science" has been applied can be reduced, time is made available for the better teaching of human biology and, in the clinical years, for the inculcation of valuable points of view and habits of mind. Both as students and teachers, many within the dental profession have felt that much of the preclinical bench technique was protracted, dull and non-contributory. Reasons for this belief are: (1) many hours are taken up in the teaching of techniques which are at best only indirectly related to the meeting of clinical problems, (2) the student too often finds himself half-heartedly performing mere routine exercises, the significance of which he does not understand. The lapse of time between the technique courses and their clinical application may eliminate much of the value of these exercises both because the student forgets and because it is impossible for him to give meaning to his exercises by projecting himself a year or two into the future, (3) there is a misplaced emphasis upon technical performances rather than upon the patient. Until a student has had an opportunity to see what carious processes actually look like, to understand the nature of dental disease and its significance to the patient, he is poorly prepared to understand the rationale of dental restoration. Needless to say, any reduction of technique must be accomplished without sacrificing the quality of dental service. Four years of experience, during which this phase of dental technique has been largely eliminated from the curriculum, offer convincing evidence that much can be done toward this end.

Students in the Harvard School of Dental Medicine spend their entire first two years in the Medical School during which period no time is devoted to the usual laboratory courses in dental techniques. Thus, when the student comes to the Dental Infirmary at the beginning of the

TABLE 1.

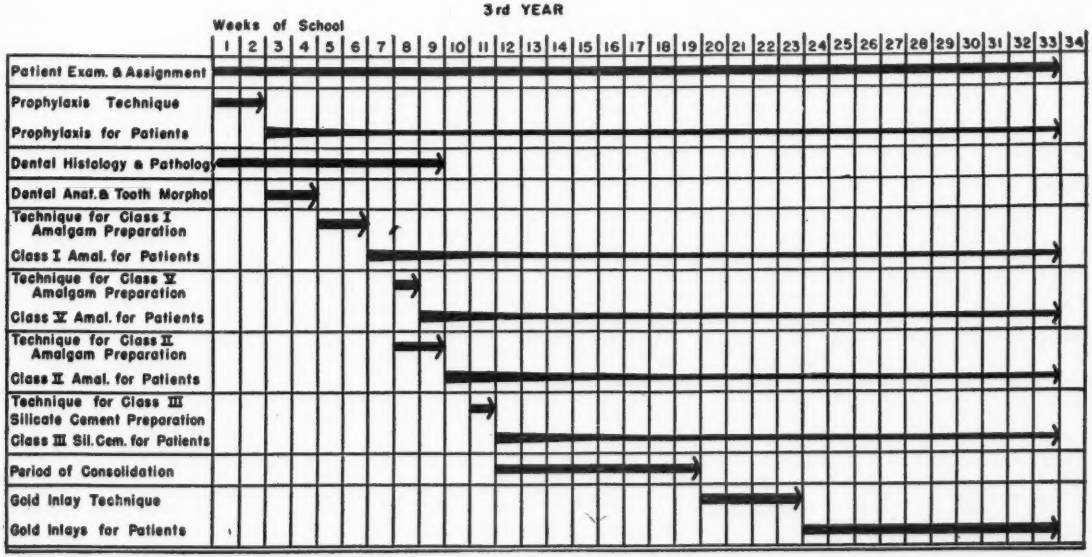
3rd YEAR
Weeks of School
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34
Patient Exam. & Assignment
Prophylaxis Technique
Prophylaxis for Patients
Dental Histology & Pathology
Dental Anat. & Tooth Morphol
Technique for Class I Amalgam Preparation
Class I Amal. for Patients
Technique for Class V Amalgam Preparation
Class V Amal. for Patients
Technique for Class II Amalgam Preparation
Class II Amal. for Patients
Technique for Class III Silicate Cement Preparation
Class III Sil. Cem. for Patients
Period of Consolidation
Gold Inlay Technique
Gold Inlays for Patients

TABLE 1. Summary of the third year curriculum in the restorative field of operative dentistry. The broad lines terminated by arrow heads represent periods during which the introduction of basic work in each field is emphasized. Tapering narrow lines indicate progression of study in the various fields through clinical practice. Work in dental histology and pathology as well as dental anatomy and tooth morphology continues as an integral part of the clinical work. Clinical activities represented in this diagram continue throughout the fourth year. Instruction in gold foil is given on an optional basis during the fourth year.

third year, he has had the best available training in human biology, the so-called basic medical sciences, upon which to build. Although he has had no specific dental training to date, he has been introduced to the oral cavity and its contents as integral parts of the human organism.

An understanding of the subsequent description may be aided by reference to Table 1 which summarizes the curriculum for the third year in diagrammatic form. The curriculum during the fourth year, because of its flexibility, does not lend itself to representation in this way.

As an introduction to clinical dentistry, the first assignment is a patient. The student inspects the patient along with an instructor, observing the teeth, tongue, oral structures, etc., and discusses the patient's problems and their solutions. A history is taken and the mouth is charted. In each case the patient assigned needs simple as well as more complex dental restorative work—work which the student will be able to complete during his two-year period of training in the Dental Infirmary. The student is encouraged to seek completion of all dental operations necessary to the health of the patient rather than to select at random one type of restoration here and another there to fulfill numerical requirements.

Before actual treatment of the patient commences, seminar discussions, lectures and demonstrations prepare the student in specific techniques necessary for carrying out the treatment program which has been outlined. The first operation that the student performs for his patient is an oral prophylaxis. Accumulations of debris, stain and calculus, and damage to the gingival tissue have been pointed out and discussed during the examination together with their possible relationships. Before actual work in the patient's mouth is undertaken, skill is acquired through the use of an odontotype replacing the headrest on the student's dental chair. Chairside operating conditions obtain and the same instruments, positions and movements are employed as in the actual performance of prophylaxis. Demonstration prophylaxes are performed by instructors on patients and detailed explanation is given to groups of four to five students. Finger positions, the choice of instruments and their efficient use are stressed. After this, each student starts practice upon his odontotype, continuing not until he has completed a required number of repetitions but until he acquires a degree of skill satisfactory to the instructor. For the average student, this has required about twelve hours. When adequate skill has been attained, a prophylaxis is given to a fellow student and then to the assigned patient under the supervision and guidance of an instructor. This stage of progress is usually reached during the third week of school. The immediate clinical application of technical procedures to the care of a patient and a realization of the role these

procedures play in preparation for more complicated operative techniques provide an interest and incentive for the student that is not found in preclinical laboratory technique courses. While training in prophylaxis is in progress, the teaching of dental anatomy is begun in preparation for more demanding dental operations, such as the placing of restorations.

In the usual course in dental anatomy many hours are spent by the student in carving teeth in plaster, ivorine, bone or some comparable material. We feel that greater value lies in a study of extracted natural teeth than in attempting to duplicate artificial tooth forms which have been mathematically derived. To this end, outside reading is assigned, lectures are given and discussions held with the entire class seated around a table with hundreds of cleaned, natural teeth for study. Examples of all tooth types are included. Teeth are studied, one by one, until the student can name and describe accurately every groove, inclined plane, triangular ridge and fossa. Oral quizzes and spotting examinations are used to determine whether the student is versed in external morphology and is ready to proceed with the internal anatomy of the tooth. The latter is accomplished by sectioning representative teeth to obtain information concerning the size, shape and position of the pulp chamber in both young and adult teeth, and relative thickness and positions of the enamel and dentine.

At this point, about the fourth week, a new procedure is introduced which has a two-fold purpose. Extracted teeth which have been thoroughly cleaned and dried and which contain all sizes and shapes of carious lesions are given to the students to be restored with inlay wax. Inlay wax and wax carving instruments are thoroughly discussed and methods of manipulation demonstrated. Thus the newly acquired knowledge of dental morphology is immediately put to use and at the same time an important practical phase of operative dentistry is introduced. Beginning with the simplest carious lesion and gradually progressing to lesions which include marginal ridges, portions of occlusal surfaces and, finally, the entire crown, the student adds to his knowledge of dental anatomy by replacing missing parts of the carious, natural tooth itself. He acquires experience and skill which is directly related to the carving of amalgam restorations soon to be undertaken, as well as a basis for later work in the preparation of gold inlays.

In reference to the teaching of dental anatomy, it is of interest to note an experiment which though a minor one in itself demonstrates an important fundamental concept. During the first three years of operation of the School, material available in textbooks was taught by the lecture method during the time allotted for dental anatomy. Last year,

in the two weeks preceding the actual beginning of the course, independent study was required of the students based upon textbook reading assignments. Distinctly better results were obtained by this method than by that previously used. It is clear from this experiment that our preoccupation with the lecture method causes us to lose sight of the ability of a student to learn by himself through reading. Further experience in this field is badly needed to determine best methods to stimulate the student to this type of learning. As a start, it is essential that we treat the student as a mature adult, that we both assume and respect his ability to learn and think for himself, i.e., that we treat him like a fellow scholar.

Near the end of the course in dental anatomy, seminars and lectures in roentgenographic interpretation are begun. Complete intra-oral and bitewing X-ray films are taken of the teeth of the students. These films are carefully studied for normal and abnormal findings. X-ray examinations are also made of the teeth of the assigned patients and these likewise are carefully studied until, day by day, an ability to read and interpret dental X-ray films is achieved.

Beginning the very first week and continuing for four hours each week for eight weeks, a course in dental anatomy, histology and pathology is given. This consists of seminar discussions, gross and microscopic studies of the teeth and adjacent structures, both normal and pathological. These exercises prepare the student for specific lectures and seminars given by the operative staff concerning the carious lesion, types of caries, incidence and treatment of these and other lesions of the oral cavity. This is followed by seminar discussions and assigned reading on cavity preparation, limiting the discussion to only the very simplest type, the Class I amalgam cavity preparation. When such adequate preparation has been achieved, the class is again divided into small groups of four to five students and an instructor, after having placed the rubber dam, demonstrates a Class I amalgam cavity preparation on a patient while the students observe. During the preparation, the instructor is very specific in outlining each operation, each instrument and each bur that is used. The cavity outline is determined by the caries incidence of that particular patient. If the caries incidence is exceedingly high, the need for a more radical preparation is emphasized, and vice versa. At all times, the treatment of the carious lesion is performed in accordance with the specific needs of each particular patient.

After thus observing the problems and understanding the principles involved in the placing of a Class I amalgam restoration, the student proceeds to acquire the specific technical skill which is the prerequisite

to performing a similar operation for his patient. As for prophylaxis, manikin-type odontotypes are used. The student places a rubber dam and, following the procedures which have just been demonstrated, prepares a similar cavity in an ivorine tooth, using the same burs and instruments. Ivorine is used because of its soft, easy cutting properties. It is felt that this physical characteristic is a distinct advantage because of the extreme difficulty in not over-carving a preparation. A student must be technically proficient to control his handpiece or contra angle to produce a conservative preparation with all internal anatomy detailed and sharp. After the odontotype exercise the student is given a clean, moist extracted tooth and a similar cavity preparation is carved in it. An appreciation of the difference between carving ivorine and actual tooth substance is thus obtained. The efficiency of these procedures is obvious. The student has just observed the operation and he is interested. He knows why this particular type of preparation is used in this particular case. He realizes, also, that since his next task is to perform a similar operation on his patient in the immediate future, he must be prepared technically. This provides an incentive which leads to an increased efficiency in learning.

After approximately seven weeks, the advantage of a tutorial type of teaching begins to manifest itself. Some students show themselves capable, technically, to proceed to the patient after making two or three Class I amalgam preparations on the odontotype. Other students have to make many more to achieve the same degree of perfection. Once proficient in a given type of restoration we encourage the student to proceed, not penalizing him and holding him back because other members of the class are not equally advanced technically.

The introductory work in amalgam restoration obviously has required some knowledge of materials used. Instruction in dental materials and their uses is presented as an integral part of each clinical phase rather than as a specific and isolated course. Thus, as a part of the introductory material already described, properties, characteristics and manipulation of dental amalgam and dental cements have been thoroughly covered.

After the student has placed his first amalgam restoration for a patient, he repeats the operation a sufficient number of times to clinch his grasp of basic principles and acquire manipulative ability and familiarity with this type of restoration. He then continues with the aid of similar teaching procedures to add Class V and Class II amalgam restorations to his armamentarium. When the various types of amalgam restorations have been demonstrated and performed on patients, similar procedures to those just described are employed for the Class III silicate restoration.

At this point in the student's training—approximately the twelfth week—we halt in the preparation of new material in operative dentistry to consolidate that which has been given previously. The plan of the staff is to continually add new phases of teaching but at intervals, to allow time for such periods of consolidation. It is specifically intended, however, that the student not continue in any one phase of dentistry, for example, the placing of amalgam restorations, until he feels that he has mastered the technique completely. Two years ago the third year students were urged to concentrate on amalgam restorations until technical excellence was achieved with the result that in the fourth year they were reluctant to place further amalgam fillings even though these were needed by the patient. They felt that they had worked with amalgam for a sufficiently long period and that it was not profitable for them to spend more time with this procedure. From a purely technical standpoint, this was undoubtedly true but defeated our stated policy of having the student complete everything necessary for his patient's welfare. At the present time, we watch the student's progress carefully and introduce new material just before he feels that he has mastered that which has been given previously. In this way he feels that he must still do amalgam work in the fourth year because he has not done enough to make him feel competent. In addition, the staff can proceed at a more rapid pace with the introduction of technical procedures in the third year, with the result that the fourth year will then be entirely free for integrated practice in all phases of dentistry, clinical work in the various hospitals, or research work on student projects.

Approximately eight weeks are spent in the aforementioned "period of consolidation." By the end of this period, the student has examined patients, given prophylaxes and placed all types of amalgam and silicate restorations. (In other fields of dentistry, he has finished the technique for complete denture prosthesis and is already at work on a practical case; he has learned to take compound and alginate impressions and has one or more simple orthodontic cases under treatment.)

Thus, at approximately the twentieth week, the student has sufficiently familiarized himself with working in the mouth to allow him to proceed efficiently with more difficult operations in operative dentistry. At this time, a concentrated four-week course in gold inlay construction is begun. The methods used in teaching this technique are similar to those used in teaching the amalgam technique and are based upon what the student has learned previously. Every effort is employed to make the approach to gold inlay construction as simple as possible. To this end, gold inlay preparations are taught as variations from already understood general

principles learned in the amalgam technique. The inlay preparations are explained in steps corresponding exactly to those employed in the amalgam technique with stress placed on how and why they differ. Lectures and discussions are followed by demonstrations of cavity preparation and the setting and finishing of a gold inlay for a patient. Following the demonstrations, the student makes similar cavity preparations on the odontotype until he has shown his ability to perform the operation on a patient. Simple preparations are followed by more difficult ones until all of the principles of gold inlay cavity preparation have been covered.

From the standpoint of continuity and efficiency, we have found it advantageous to combine the teaching of gold inlay technique with the technique of fixed and semi-fixed bridge construction. Inlays used as abutments for most fixed and semi-fixed bridges are essentially the same as inlays used as single units—differences lying mainly in added retention and, perhaps, amount of tooth coverage. Using the same procedures as before and again stressing variations from already understood basic principles, we attempt to present the course as simply an additive phenomenon and not as an accumulation of highly complex and difficult preparations. An example of this is the preparation on the odontotype of an M.O.D. gold inlay as part of the gold inlay technique. This inlay, later, will be used as one abutment of a fixed bridge—and will not have to be remade at that time. Much can and should be done along similar lines to avoid unnecessary duplication. The duplication of teaching by departments that exists in many dental schools is a factor which we are trying to eliminate. It is absurd that, for example, the mixing of stone and plaster should be taught differently in different departments simply because department heads do not agree on the best methods.

In preceding years, the technique course in fixed and semi-fixed bridge prosthesis was scheduled in the fourth year. Three or four periods per week were allotted to this phase of teaching and the course required several months for completion, necessitating the presence of the entire class at each demonstration period. This seriously interfered with the flexibility of the program in the fourth year. Next year, as a possible solution to these difficulties, we plan to present the course at the beginning of the year, the entire first two weeks to be utilized for technical training to the exclusion of all other work. By so doing, we hope to gain (1) an increased efficiency in teaching and (2) a freedom from group demonstration during the rest of the year, which will allow the student a wide range of flexibility in clinical dentistry or allied fields.

An optional course in gold foil technique is given one afternoon per week during the fourth year. In this way, the student may satisfy his

individual needs depending upon his interest and upon the state board requirements in the area in which he intends to practice. Technical training in gold foil is intended to utilize and supplement the basic experience which the student acquired in making amalgam and gold inlay restorations. Lectures are given followed by patient demonstrations. Specific technical procedures new to the student are then carried out on odontotypes at the dental chair. When the student has acquired sufficient skill, he performs the operation on patients. Simple Class I and Class V gold foil preparations are followed by more difficult Class III type preparations.

An important characteristic of the program just described is that the student devotes a large majority of his time to one specific subject for a short period, and when this subject is almost mastered shifts his attention forward to the next subject in logical progression. Thus lectures, seminar discussions, technique and clinic practice are all thrown very close together in time with consequent excellent motivation. Consolidation periods and the fourth year provide opportunity later to correlate the various phases. This method is in sharp contrast to the more conventional one where many subjects progress side by side, all at a slower pace.

In evaluating the merits of the Harvard program, several advantages become apparent. One is the extreme flexibility that is inherent in it. Seminar discussions and lecture material can be used to augment rather than duplicate reading and clinical experience. Because of the close association between the lectures, seminar discussions and the clinical work, the instructor can present the material as rapidly as the class progresses, at no time getting ahead of what the student is doing, neither getting behind. This eliminates the need for fixed lecture hours, scheduled many weeks or months in advance, which must be met by the instructor whether the pertinent subject material has been covered or not.

Another feature of a flexible program is that the good student does not have to be held back because of the poor student. The speed with which material is given may thus be geared for the good student. Close clinical supervision discloses very early to which student clinical technique comes easily and thus he is allowed to proceed rapidly, while the slower student becomes a real challenge to the instructor and is given additional help in order for him to become proficient. This also adds to the student's interest because it is possible to keep the rapidly advancing student interested by giving him advanced work, while the extra concentration by the staff on the slow student keeps him from getting discouraged.

The question of minimum student requirements and methods for de-

termining whether a student has completed sufficient work for graduation is one which has troubled educators for years. To obtain maximum flexibility in the program and, at the same time, maintain a high standard of performance, each member of the staff has compiled a list of minimum requirements in the field for which he is responsible. This list presents an absolute minimum. No student, regardless of his special interests and activities, will be suggested as a candidate for graduation unless he has met these requirements. Fulfillment depends upon the quality of individual accomplishment and not merely upon the number of operations completed. With a system such as this, a wide range exists in the quantity of work done by each student. In last year's third year class the range was as follows:

Amalgam Restorations	Minimum	Maximum
Cl. I	10	29
Cl. II MO-DO-MOD	15	39
Cl. V	8	15
Silicate Restorations		
Cl. III	5	10
Gold Inlay Restorations	2	8

We have stated that after a student has demonstrated his ability to perform a certain operation satisfactorily, he is not obliged to continue with that operation to fulfill a numerical requirement. With this in mind, variation in the number of operations performed can be interpreted as follows: (1) a student may show a minimum number of operations because (a) his primary interest does not lie in operative dentistry. He is interested, perhaps, in complete denture prosthesis, research, oral surgery, or the hospital clinics and has substituted these activities for additional operative experience after he has demonstrated satisfactory proficiency in each phase of operative dentistry; (b) he is interested in operative dentistry but works at a very slow pace, thus not producing as much as his classmates. (2) A student may show a maximum number of operations because (a) he has had difficulty in acquiring manual dexterity and he has been required to perform additional operations until proficiency has been attained; (b) he is particularly interested in operative dentistry, working rapidly and producing work of excellent quality. This student will have greatly exceeded minimum requirements not of necessity but because he thoroughly enjoys it.

Another advantage of a program of this type is the great over-all saving in time which it affords. At present, by the use of many experimental methods in the teaching of all phases of clinical dentistry, a few of which are described above, we are attempting to free large blocks of

time in the fourth year which may be used advantageously by the student. This time may be spent in doing more advanced work in any phase of clinical dentistry, additional work in dental medicine and diagnosis of oral disease, additional work in the research laboratories in our own school, research work on some project that the student has become interested in during his dental training in the third year, or in training promising students to become dental teachers by allowing them to assist the succeeding class in the acquiring of manipulative skills. In addition to all this, we are attempting to graduate a student who, technically, will be as well qualified to practice dentistry as a graduate of any other dental school in the country.

The task of comparing the degree of excellence of this teaching with that of former times is a difficult one. It is still too early to judge. However, experience has shown us that individual students who are gifted manually become excellent operators in this program even before the end of the two-year term. It is common knowledge that all students after graduation seek a level of technical performance as much related to their inherent standards and desires as to the amount of technical training they have received. A man with no desire to do work well is likely to deteriorate after graduation in any event. When there is a desire for professional capabilities, we believe that the program described offers a better basis upon which to build than the conventional one.

At the present time, the Infirmary of the Harvard School of Dental Medicine has reached the end of its fourth year of operation. Change and experimentation consistent with the graduation of a well-trained dental scientist has been the rule of procedure. Many of the methods used two, three and four years ago have now been discarded and new, more efficient ones substituted. In order for a program such as this to be successful, there must be a ruthless elimination of curricular deadwood and a willingness on the part of all members of the teaching staff to break away from accepted rules and methods in an endeavor to find new ways and means of dental teaching—methods that will meet the ever-changing and ever-increasing demands that will be placed upon the dental profession in the future. The staff has learned much from the experiment as far as it has gone. There are many more changes which will be made in the future. The curriculum is by no means finished as it is today. Many of the anticipated changes and improvements have materialized; some have not, simply because the experiment is entirely new to the staff as well as to the student. Having had four years of experience, the staff is tremendously enthusiastic about the future.

TEACHING AIDS: REPRODUCING ANATOMICAL SPECIMENS IN WAX

CARL P. REGLI, D.D.S.[1] and JEROME C. STRAIN, D.D.S.,[2]

It is recognized that a knowledge of the anatomy of the mouth is necessary to intelligently construct prosthetic appliances. Articles on the application of anatomy to denture prosthesis have appeared in the literature[3, 4, 5, 6, 7] and the physical form and position of structures has been the basis of various classifications.[8] However, a method is needed by which we may apply the basic science of anatomy to clinical practice.

In undergraduate teaching it is desirable to correlate and demonstrate the influence of these structures on the denture outline. This may be accomplished during the mouth examination and while building the impression, providing suitable teaching aids are available during clinical instruction.

The preparation of anatomical specimens for this purpose is time-consuming and when dried they often become distorted. Wet specimens are impractical in the clinic from the standpoint of handling and patient objection. Wax reproductions may be used to demonstrate the influence of anatomical structures to a specific clinical situation. Their preparation requires less time and the method of reproduction does not destroy the anatomical material, thus allowing any number of different reproductions from the same specimen. Figures 1, 2 and 3 *(see page 114)* illustrate sequence in reproduction from the same specimen at three different depths.

Preparation of the Specimen

When preparing the specimens we found it advantageous to include superficial landmarks which could be demonstrated clinically. They will serve as a means to orient the relative position of the structures to one another. For example the inclusion of the retro-molar pad (Fig. 4) enables the student to determine the relationship of such structures as the su-

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[2]Clinical Instructor in Denture Prosthesis and Oro-Facial Prosthesis, University of California, College of Dentistry.

[3]Shapiro, H. H.: The Need for Clinical Applications of Anatomy in Dentistry, Journal Dental Education, April, 1946, page 226.

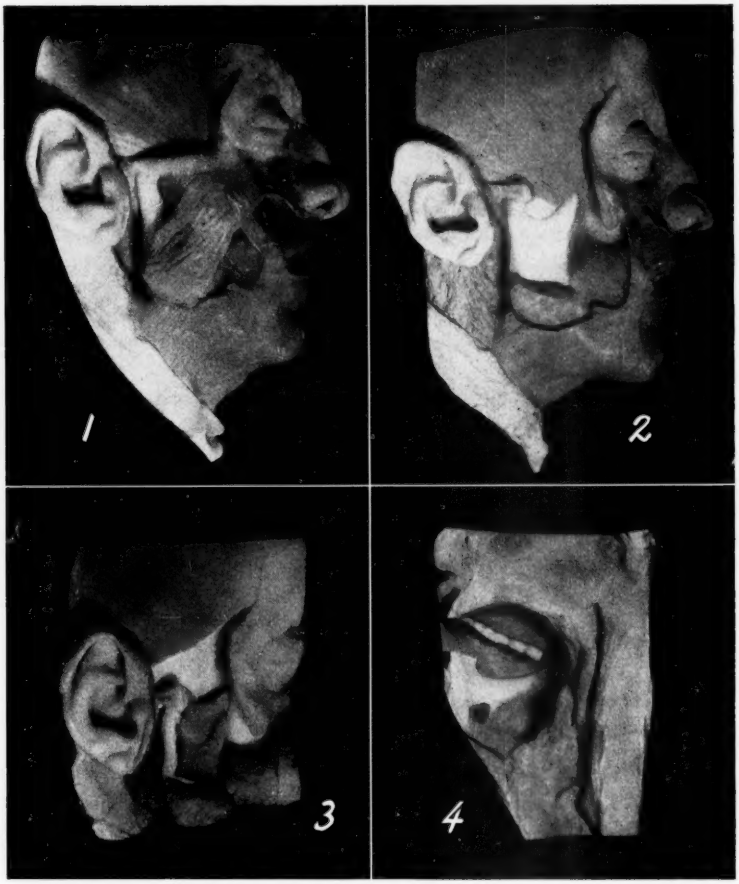
[4]*Ibid*: Anatomic Considerations in Prosthodontics. *New York State Dental Journal*, Aug., 1948, page 369.

[5]Pendleton, E. C.: The Minute Anatomy of the Denture Bearing Area.

[6]Boucher, C. O.: Complete Denture Impressions Based upon the Anatomy of the Mouth. *J.A.D.A.*, Vol. 31, Sept., 1944, page 1174.

[7]Edwards, L. F. and Boucher, C. O.: Anatomy of the Mouth in Relation to Complete Dentures. *J.A.D.A.*, Vol. 29, March, 1942, page 331.

[8]House, M. M.: A Classification of the Osseous Muscular and Tissue Conditions of the Edentulous Mouths. *Prostbetic Dentistry*, Nichols. St. Louis, 1930, C. V. Mosby Co.



perior constrictor, mylo hyoid and genio-glossus muscles. In preparing a sequence, the superficial structures are exposed and after the impression of this area has been obtained, further dissection is carried on exposing the deeper structures. If we wish to reproduce an area well within the specimen, it may be exposed rapidly by the use of the band saw. Motor driven saws are available for this purpose. We experienced difficulty in maintaining the direction of cut unless some means of orienting the specimen to the saw was provided. By freezing the specimen in a block of ice, it may be oriented to the saw blade in any relationship desired

by cutting the base of the ice block. Sections less than one quarter of an inch were made without undue tearing of the soft tissue structures. After the initial sectioning is made, further dissection is carried out in the usual manner.

Impressions

The preparation and construction of this type of moulage differs from the ordinary moulage in that we are concerned not only with the reproduction of tissues and their relative position, but the preservation of the specimen for further dissection. The impression of these dissections is of a highly complicated nature due to the many undercut areas and the delicate structures to be recorded. It is therefore of paramount importance that a suitable impression material combined with an exacting technique be employed. In our work we used "Plastico Moulage" which is a hydrocoloid prepared for this purpose. Ordinary hydrocoloid materials, when used, often fracture. This may be avoided to some extent by the addition of long staple cotton fibers.[9] The cotton fibers allow the material to be withdrawn from slight undercut areas without excessive breaking of the impression. We must not, however, depend upon the fracture of this material when impressioning delicate dissections, so it may be necessary to resort to the two or more piece mold. The thread cut mold may be used to advantage occasionally, but it oftentimes interferes with the detail of the structures.[10] The hydrocoloid may be used at a higher temperature than when operating on a living subject. It is best applied with a stencil brush starting at the deepest area on the specimen. After an initial layer has been painted over the surface, larger amounts are added with a spoon or pastry tube. If we are to use more than one section or piece, a hand hair-dryer is a convenient means of chilling each unit, thus allowing section after section to be built up. They are stapled together as they are removed and then prepared for the casting material. When a single section is used, we usually make it thin and reinforce the moulage with a plaster backing. These impressions should be poured immediately, to prevent dehydration with resultant shrinkage and distortion.

Casting the Model

There are a number of excellent casting materials available. Wax was chosen because of its fidelity of detail. Also, it is far superior to most casting materials for the casting of medical and biological subjects, due to the lifelike appearance that it imparts.

[9]Clarke, C. D.: Facial and Body Prosthesis. St. Louis, 1945, C. V. Mosby Co.
[10]*Ibid.*: Molding and Casting: Baltimore, 1940, John D. Lucas Co.

The following is a simple formula for a casting wax which produces the desired results:

White beeswax	3 parts
Paraffin (high melting point 56-58°C)	2 parts
Calcium carbonate	1 part
Color to suit	

We found it advantageous to tint the wax to the color of the lightest shade of the finished reproduction. The coloring material can be any good artist's pigment ground in oil. The pigment is more readily dispersed throughout the molten wax when previously dissolved in one teaspoonful of carbontetrachloride. A word of caution should be given the inexperienced operator at this point. Wax that has a filler should always be heated in a double boiler. This prevents the calcium carbonate from burning.

Finishing and Coloring the Model

Refining of the wax model is best accomplished immediately after separation from the impression. While the wax is still warm its working qualities allow tooling without chipping or fracturing and consequently artifacts are easily removed at this time.

Surface coloring to differentiate and highlight the structures may be accomplished by hand stippling with a brush. However, when the oil colors are thinned with turpentine and sprayed on the model, a satisfactory result may be obtained with less difficulty of application in considerably less time. Small structures such as nerves, blood vessels, etc., must be colored by hand.

Mounting the Reproduction

A black velvet background is excellent for mounting as the material lends itself to draping. Usually the model and velvet are attached to a piece of plywood as this affords an easy means by which they may be displayed or transported.

Summary

This method presented allows any number of faithful reproductions to be made from the same specimen. Valuable anatomical material is preserved as impressioning does not destroy the dissection. Various stages of the dissection are reproduced, enabling us to obtain a sequence by preparing only one specimen.

The wax reproduction is believed to be superior to the prepared anatomical specimen for clinical instruction. Landmarks may be emphasized by highlighting and coloring. When suitably mounted, they are easily handled, providing a means by which the clinical instructor may correlate and demonstrate the influence of anatomical structures to the denture outline.

COLLEGE NEWS

Edited by SIDNEY EPSTEIN, D.D.S., *San Francisco*

Western Reserve University:

FACULTY APPOINTMENTS

Dr. John B. Walsh, Instructor in Anesthesia and Oral Surgery.

Dr. John P. Clark, Teaching Fellow in Pharmacology.

Dr. Sholom Pearlman, Instructor in Biochemistry.

RESIGNATIONS

Dr. Roland Yant and Dr. George Gartner, Assistant Professor, Dental Prosthesis, have resigned to devote full time to private practice.

University of Toronto:

FACULTY APPOINTMENTS

Dr. Robert Moyers, Professor of Orthodontics and Head of the Department, coming from the University of Iowa.

Dr. J. B. Macdonald, Assistant Professor of Bacteriology.

Harvard University:

FACULTY APPOINTMENTS

Mrs. Alicia M. Howard, A.D.N.A., Assistant Professor of Oral Hygiene.

Dr. George W. Wade, Assistant Professor, Oral Diagnosis.

Dr. Bhim Sen Savara, Assistant Professor, Pedodontia.

University of Iowa:

FACULTY APPOINTMENTS

Dr. Paul W. Griewe, Instructor in Orthodontics.

Dr. Alton K. Fisher, Professor and Head of the Department of Oral Pathology.

Dr. Woodrow Morris, Assistant to the Dean.

Dr. Roscoe J. Thoew, Instructor, Clinical Prosthetics.

Dr. Charles F. Smayda, Clinical Instructor, Operative Dentistry.

Dr. Nathan R. Callaghan, Clinical Instructor, Dental Prosthetics.

Temple University:

FACULTY CHANGES

Dr. Carlos Weil, Professor, Operative Dentistry.

Dr. A. R. Baralt, Jr., Assistant Professor, Crown and Bridge Prosthesis.

Dr. Carl E. McMurray, Clinical Professor, Prosthetic Dentistry.

FACULTY APPOINTMENTS

Dr. J. H. Eskelman, Lecturer, Practice Management.

Dr. J. H. Kolner, Instructor in Medicine.

Drs. H. B. Cutrone and Stanley T. Nowinshi, Instructors in Periodontia.

Drs. Theodore Stezeshi and Michael Collito, Instructors in Orthodontics.

Dr. P. T. Freyvogel, Instructor, Prosthetic Dentistry.

Dr. John F. Blanch, Instructor, Crown and Bridge Prosthesis.

Northwestern University:

RETIREMENTS

Dr. Robert E. Blackwell, Professor, Operative Dentistry, and Dr. George B. Denton, Professor, Dental History and Literature, have retired under the title of Professor Emeritus.

Washington University:

FACULTY APPOINTMENTS

Dr. Stuart C. Stanhope, Dental Medicine.

Dr. David A. Bensinger, Dental Medicine.

Dr. Warren C. Speiser, Dental Pediatrics, Dental Prosthetics.

Drs. Stanley M. Norcom and H. W. Rinesmith, Operative Dentistry.

Dr. Fred O. Baetz, Oral Surgery.

Dr. Louis H. Jorstad, M.D., Oncology.

Dr. Marvin S. Burstone, Pathology.

Dr. George M. Hansford, Jr., Radiodontics.

Dr. J. M. Gillette, Crown and Bridge Prosthetics.

Dr. H. C. Wieser, Materials and Technology.

University of Kansas City:

Faculty Appointments

Dr. M. L. Hate, Chairman, Oral Surgery Division.

Drs. J. W. Sutton and C. W. Harper, Assistant Instructors, Operative Dentistry.

Drs. Jack Green and William Adamson, Instructors, Operative Dentistry.

University of Pennsylvania:

Faculty Appointments

Drs. J. E. Kneisel, Raymond Werther, C. J. Wylde, Jr., J. V. Masino, J. J. Berg, and J. P. Looby have been elected to Associate Professorships.

Resignations

Drs. J. H. Green and R. U. Klees to give full time to private practice.

Announcements

The school announces a "new dress" for the Oral Diagnosis Clinic.

Deaths

Dr. J. H. Gunter, for 35 years a member of the faculty, died September 22, 1949.

University of Illinois:

Promotions

Maury Massler: Professor, Graduate Pedodontia.

Joseph Weinmann: Professor, Oral Pathology.

Arthur Elfenbaum: Chief Examiner and Associate Professor, Clinical Dentistry.

Eli Olech: Director, Minor Oral Surgery.

F. N. Bazola: Associate Professor, Crowns and Fixed Partial Dentures.

E. J. Krejci: Assistant Professor, Operative Dentistry, *Emeritus.*

J. A. Gagnon: Assistant Professor, Oral Anatomy.

R. A. Arnold: Instructor, Full and Removable Partial Dentures.

M. A. Szmyd: Instructor, Full and Removable Partial Dentures.

Appointments

Julia Meyer: Research Associate, Oral Pathology.

Leo M. Sreebny: Research Assistant, Applied Materia Medica and Therapeutics.

Anthony J. Malone: Instructor, Graduate Pedodontia.

Robert Rickets: Instructor, Orthodontia.

J. Fredrick Burgh, Jr.: Assistant, Full and Removable Partial Dentures.

Benjamin Gans: Assistant, Oral and Maxillofacial Surgery.

Daniel Laskin: Assistant, Oral and Maxillofacial Surgery.

Dale M. Lipe: Assistant, Full and Removable Partial Dentures.

Ralph B. Neaderland: Assistant, Graduate Pedodontia.

U. S. Public Health Service

Fellows

Arthur H. Craven (New Zealand)—Orthodontia.

J. Oscar Leiva (Guatemala)—Orthodontia.

Surindar Bhaskar (India)—Histology.

University of Illinois Graduate Fellows

Joseph Henry (Washington, D. C.)—Histology.

Theodore A. Bolden (New Jersey)—Histology.

Research Assistant

Herman Medak (Austria)—Histology.

BOOK REVIEWS IN REVIEW

Conducted by DONALD A. WASHBURN, *Chicago*[1]

CORRECTION: On Page 76, November JOURNAL, the book "Photographic Aids to Clinical Dental Practice," by James M. Dyce, the price is listed as 50 cents. This should have been **$7.00.**

Review of Dentistry, Questions and Answers, edited by James T. Ginn, B.S., D.D.S. 810 pages. St. Louis, The C. V. Mosby Co., 1949. $5.75.

"This is a volume most timely in that it is a refresher course for the busy practitioner, a concise, comprehensive, authoritative guide for those preparing for State and National Board examinations, and a general review for the undergraduate student. Some 23 chapters, each devoted to one of the basic subjects of the dental curriculum and the various subjects and phases of dental practice with which the practitioner should be familiar. Each chapter has been edited by a consultant who is an acknowledged authority on the subject. The work could be well described as a dental library, condensed into one volume. It is a storehouse of dental information." —*Journal of the Ohio State Dental Association,* August, 1949, p. 153.

"It is also a concise yet authoritative reference book. It has an extensive 57-page index. Its question and answer form makes for easy reading and understanding. It is a book which every practitioner might well keep handy for daily reference.

"But it is more than a reference book; it is, as the title implies, a general review and as such its entire perusal will well repay the practicing dentist.

"Naturally, the book has some shortcomings. There is a lack of bibliographical references for the benefit of readers who might wish to obtain further information on a particular subject. There is also a super-conservative attitude toward recently accepted findings. For instance, in *Histology,* the functions of the dental pulp are given only as vital and sensory and not nutritive; also there are some omissions, such as the failure to differentiate structurally between the mucous membrane lining the mouth and gingival tissue; and the discarded view is stated that odontoblasts have the sole function of dentin formation. We realize that in a book of this nature only generally accepted material should be included. However, the above observations are no longer controversial and are generally described in leading textbooks. It would seem, therefore, that there are several recent findings so generally accepted that the material might well have been included."—C.F.B. *New York State Dental Journal,* October 1949, pp. 481-482.

"The volume is presented with each dental subject covered in a separate chapter, 23 chapters in all. As the list of collaborators indicates, each chapter has been reviewed and edited by a known authority on that subject and all-in-all the volume adds much to the books of dental review. Both graduate and undergraduate student should possess it and for the general practitioner, it will serve well as a refresher medium as well as a ready reference and memory reviver."—*Bulletin of the National Dental Association,* October, 1949, pp. 57-58.

"Every phase of dentistry gets a complete coverage in this book and every question has been a frequent repeater in the armamentarium of the examiner. Your reviewer cannot promise that if you know all the answers you will pass such tough

[1]Librarian, American Dental Association.

boards as Florida and California, but it will help."—J.H.K. *Fortnightly Review of the Chicago Dental Society*, October 15, 1949, pp. 15, 27.

"Most of the questions and answers in the book are stated concisely but, perhaps, could have been made more understandable in some cases by the use of a few additional words. Also, where an answer differs from a generally accepted idea or is on a controversial subject, a brief explanation might be in order. In some instances cumbersome words not commonly found in the medical dictionaries are used, such as 'Hyporiboflavinosis,' on page 361, when riboflavin deficiency would be a more readily recognized term. The subjects needed for state board examinations are covered but one wonders if the chapters should not be arranged in a more logical sequence with related subjects following one another.

"On the whole, this book is a fine help for those needing to review dentistry for any purpose and affords a great deal of concise information, fairly well indexed, at a reasonable price. It is a valuable addition to the question and answer books which are so popular at this time."—J.P.H. *Journal of the American Dental Association*, October, 1949, p. 484.

"Review of Dentistry is an up to date ready reference book, useful to those preparing for professional examinations and also practitioners and students. The book has been carefully compiled by well-known authorities in respect to each subject. The answers are concise and definite. The precise information is made readily available, which in many cases might require much searching through the literature."—D.W.G. *Journal of the Canadian Dental Association*, August, 1949, p. 443.

A Comprehensive Review of Dentistry for Use in Preparing for Dental State Board Licensing Examinations, by Vincent R. Trapozzano, D.D.S. 661 pages. Philadelphia, W. B. Saunders Company, 1949. $6.50.

"This comprehensive review of dentistry prepared in question and answer form by twenty-five experts in their particular fields fulfills its twofold purpose of providing an authoritative guide for those preparing for state board examinations and a general review for undergraduate students and general practitioners of dentistry. Furthermore, it will prove of great service to the oral surgeon as a ready source of reference to the important basic science subjects and to anesthesia, principles of medicine, oral diagnosis and treatment planning, dental medicine, essentials of nutrition, roentgenology and dental jurisprudence."—C.W.W. *Journal of Oral Surgery*, July, 1949, pp. 267-268.

"The materials are presented in form of Questions and Answers on some 24 subjects. Contents of subjects are distributed in intimate sequences, thus giving the reader a broader scope of comprehension. Scores of authoritative men have contributed unselfishly from schools throughout the country. Occasionally, repetitions and conflicts occur, but they are of considerable interest and it is the responsibility of the individual reader to evaluate them judiciously." — G.T.N. *Minneapolis District Dental Journal*, March, 1949, p. 17.

"This comprehensive review of dentistry is designed especially 'For Use in Preparing for Dental State Board Licensing Examinations.' Contained within the 661 pages of this book are the contributions of over a score of men, each presenting questions and answers on a particular subject of the dental school curriculum. The material in each chapter presents a concise, orderly review of the subject and may also serve as a general review for the undergraduate student and the general practitioner."—*Tufts Dental Outlook*, January, 1949, p. 23.

"The answers supplied to the questions in the various fields are oversimplified. However, they do not reflect on the editor of the text but on the type of answers to questions expected by Dental State Board

Examiners."—*New York Journal of Dentistry*, June-July, 1949, p. 250.

"The questions are reasonable and practical, and the answers have been well edited and clearly phrased. The index is complete, and cross references are included."—*Oral Surgery, Oral Medicine and Oral Pathology*, July, 1949, p. 940.

"This book, though intended primarily for those taking state board examinations, is also intended to serve as a general review for the undergraduate student and the general practitioner and can be heartily recommended." — J.P.H. *Journal of the American Dental Association*, July, 1949, p. 105.

"The authors and publishers are to be commended for making this excellent *Review of Dentistry for State Board Examinations* available to the undergraduate student and the general practitioner."—P.H.B. *Dental Items of Interest*, April, 1949, p. 425.

"Some twenty-six authors, each a recognized authority in his subject, have been brought together to produce a unique volume. No attempt has been made to produce an encyclopaedia of dental knowledge but rather an endeavour has been made to include in one volume pertinent subject matter closely related to dental practice. Undoubtedly, the book will prove most useful to those preparing for licensing examinations. Any practitioner will find the question and answer form of presentation attractive and interesting."—D.W.G. *Journal of the Canadian Dental Association*, March, 1949, p. 151.

"This reviewer is of the opinion that too much space is devoted to certain areas at the expense of other more important areas —for instance, General Histology is allotted 40 pages, and approximately 325 questions while Oral Histology and Embryology has 25 pages and approximately 200 questions. However, this is indeed a minor criticism because the latter subject is adequately reviewed.

"All in all the book is certainly worthwhile." — W.F.S. *Pennsylvania Dental Journal*, April, 1949, p. 174.

Complete Dental Review, by Walter Neal Gallagher, D.D.S., 431 pages. Brooklyn, N. Y., Dental Items of Interest Publishing Co., 1948. $9.00.

"This book is described well by its title, 'Complete Dental Review.' It is a new work, published for the first time in 1948. Its author says in the preface that it has been written for a specific, twofold purpose: 1. To bring the practicing dentist up to date in the subjects which broadly comprise dentistry, for he says, 'Personal experience has proven that the fundamentals of dentistry are easily forgotten.' 2. To review for the dental graduate the sixteen subjects upon which he says dentistry is based. The author does not state it in so many words, but this is a book designed to aid any dentist in reviewing in a broad way all the subjects given in the various state board dental examinations.

". . . this is an excellent book with which any dentist may review the whole broad field of dentistry for any reason. Its facts seem good and yet they are streamlined enough to make the book practical."—W.P.S., Jr. *Illinois Dental Journal*, January, 1949, pp. 27-28.

"The purpose of this book is not to try to teach the dental student or graduate dentist how to practice dentistry by short cut methods but to serve as a valuable aid to the dental graduate by assisting him to keep in constant review those subjects comprising modern dentistry. Fundamentals are easily forgotten and this book provides a concise refresher course in all branches of dentistry.

"This publication contains an immense amount of information in very condensed form and should prove very valuable as a book of reference."—M.H.G. *Journal of the Canadian Dental Association*, January, 1949, p. 35.

"If these questions and answers [in the chapter on orthodontics] are all that a

student has to know to pass the state board and practice orthodontic procedure, one cannot help but feel sorry for the children who will receive the effects of such practice.

"It would seem from a review of this book that memorizing of definitions, many of which are meaningless, is all that one has to do in order to pass a state board examination. How such questions would give any indication of the ability of the examinee is a question that we would like to have answered."—*American Journal of Orthodontics,* October, 1949, p. 807.

"It is difficult to imagine in what sense the book is a complete review, nor can it be said to fulfil what the author states is the main purpose of the book, namely to serve as a valuable aid to the dental graduate by assisting him to keep in constant review those subjects comprising modern dentistry. Whether there is any demand for a quiz book the publishers will no doubt discover from the sales of this one." —*British Dental Journal,* October 15, 1948, p. 187.

Biochemistry of the Teeth, by Henry M. Leicester, Ph.D. 306 pages. St. Louis, The C. V. Mosby Co., 1949. $5.00.

"This is a field of study that our literature seemingly has left untouched but the author has shown there is a large literature dealing with various aspects of the chemistry and physiology of the teeth and statements to the contrary are based on the failure to appreciate the location and amount of literature in which the contribution of biochemistry is to be found, since it is widely scattered through journals in the fields of anatomy, biology, zoology, chemistry and physics, as well as in dentistry and medicine. In this material the author has succeeded in bringing the parts together into a whole; while many subjects covered are still of a controversial nature, an attempt is made on the basis of available evidence to present an interpretation of mechanisms involved, which must be accepted as an endeavor on the part of the author to clarify his thinking in these fields, justification for the attempt lies in the suggestions for further research. The eight chapters give some scope of the work; chemical composition of the teeth; physical properties; their formation; mineral metabolism and teeth; effect of vitamins in the development of teeth, and effect of hormones and other substances during the process; reactions of teeth after formation and eruption; dental caries. Bibliographical references following each chapter shows an exhaustive research, and brings to the reader and student in concrete form the result of extensive research, a review of which would be impossible owing to time and inaccessibility. The work is a valuable addition to our literature."—*Journal of the Ohio State Dental Association,* August, 1949, pp. 153-154.

"Professor Leicester has given a balanced criticism of the findings of many research workers and on some subjects, such as dental caries, he has attempted to interpret their findings. Some of these interpretations may not be generally acceptable, but always are stimulating. Some minor printers' errors will no doubt be corrected in later editions.

"This book will be of great value as a reference book for dental surgeons in academic life and to all those interested in research on the aetiology and prevention of dental caries. At present, it will not be of great interest to most dental surgeons in general practice, but several chapters, such as those on the formation of teeth and dental caries, should be read by all those studying for higher qualifications."—J.L.H. *Dental Gazette,* October, 1949, p. 93.

"The title of this book may sound austere, but its contents are written simply and clearly so that dental clinicians not fundamentally trained in basic science may read it easily and with benefit. Here is an opportunity to understand the biochemical reactions involved in tooth development and destruction and to keep

pace with the scientific progress in dentistry."—D.J.H. *Oral Surgery, Oral Medicine and Oral Pathology*, April, 1949, p. 544.

"Leicester has packed critical reviews of 972 papers, through 1947, into this stimulating book, yet even with such intensity one is never aware of repetitious phrases customary in reviews. The conclusive summaries are brief and clearly stated. The book is well made. It should be a potent aid and stimulus to research."—G.J.C. *Pennsylvania Dental Journal*, April, 1949, pp. 173-174.

"The book is a great one not only because it is the first in this field but because it will be pre-eminent in the field for some time to come."—G.W.R. *Journal of the American Dental Association*, October, 1949, p. 483.

"Undoubtedly forthcoming editions of this text will be more comprehensive and will prove to be of great benefit to future dental students."—P.H.B. *Dental Items of Interest*, May, 1949, pp. 551-552.

Dentistry in Public Health, edited by Walter J. Pelton, B.S., D.D.S., M.S.P.H., and Jacob M. Wisan, D.D.S., M.S.P.H. 363 pages with 64 figures. Philadelphia, W. B. Saunders Company, 1949. $5.00.

"This book presents an unusually fine compendium of dentistry's role in public health. The collaborators have presented good summaries on the topics assigned to them. These summaries, although they are brief, contain the fundamental information which the student or the practitioner needs to develop his thinking in terms of public health service."—O.W.B. *Science*, July 15, 1949, pp. 75-76.

"Seventeen authors have collaborated with the editors to produce this collection of monographs on dentistry in public health. It is designed to satisfy the widely recognized need for a textbook on public health dentistry for undergraduate dental students.

"In describing the setting and problem, the opening section fails to develop a proper historical perspective of the public health campaign which was launched about a century ago in England. While the chronologic development of dentistry as a health service is established, its relation to the public health movement remains largely unexplained. The analysis of economic aspects of a dental health program is superficial.

"The scant treatment of the professional manpower problem and the related subject of ancillary personnel seems lamentable in the light of its importance as a public health problem."—S.S.H. *Journal of the American Dental Association*, October, 1949, p. 482.

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Anatomy and Physiology, by Verna M. Vogel, B.S.M.A., Assistant Porfessor of Nursing Education, University of Georgia, and Jesse D. Perkinson, Jr., B.S.M.S., Ph.D., Assistant Professor of Zoology, University of Georgia. This is a paper-covered book of 194 pages very well illustrated. Published by C. V. Mosby Co. Price $2.75.

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Graduate and Postgraduate Dental Education (Summary of a Conference). This summary is published by the W. K. Kellogg Foundation, Battle Creek, Michigan, being the result of a program inaugurated by the foundation in May, 1945, participated in by the Dental Schools of the United States and Canada. Some twenty schools were represented by the Dean or other persons as participants in the conference. This is published free of charge, and may be had on application to the W. K. Kellogg Foundation, Battle Creek, Michigan.

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